

What is claimed is:

1. A method comprising the steps of:

identifying surrounding pels of a subject pel of an image;

for each subject pel of the image, determining a pulse width value based on a pattern of said surrounding pels;

using said pulse width values from at least two adjacent subject pels to;

calculate a combined pulse width to charge a sub-region of a combined region of said at least two adjacent subject pels; and

determine position information indicating an alignment of said sub-region within the combined region of said at least two adjacent subject pels.

2. The method of claim 1 wherein toner is attracted to the charged sub-region causing a portion of the image represented by the at least two adjacent subject pels to be printed as determined by the combined pulse width and the position information.
3. The method of claim 2 wherein said at least two adjacent subject pels consist of two adjacent subject pels.
4. The method of claim 2 wherein said at least two adjacent subject pels consist of three adjacent subject pels.
5. The method of claim 1 wherein the surrounding pels of a subject pel form a rectangular grid with said subject pel at the center.

6. The method of claim 1 wherein the surrounding pels of a subject pel form a diamond shaped grid with said subject pel at the center.
7. The method of claim 1 wherein all possible patterns of surrounding pels are grouped into a plurality of pre-defined pattern categories.
8. The method of claim 7 wherein the plurality of pre-defined pattern categories consists of 16 pattern categories.
9. The method of claim 7 wherein the determining of a pulse width value for a subject pel comprises assigning a pre-defined pulse width value corresponding to the predefined pattern category into which the pattern of surrounding pels falls.
10. The method of claim 1 wherein the combined pulse width and position information is encoded in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels;  
said pattern of said surrounding pels for each of said at least two adjacent pels;  
and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

11. The method of claim 9 wherein the combined pulse width and position information is encoded in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels; and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

12. The method of claim 8 wherein the determining of a pulse width value for a subject pel comprises assigning a pulse width value selected from the group of 0 through 15, inclusive, said group corresponding to the 16 predefined pattern categories and the assigned pulse width value for a subject pel corresponding to the predefined pattern category into which the pattern of pels surrounding the subject pel falls.
13. The method of claim 12 wherein a pulse width value of 0 indicates a totally blank (white) pel, a pulse width value of 15 indicates a totally black, or fully charged, pel and the pulse width values of 1 through 14 indicate a pel which is to be quality enhanced between white and black by creating a sub-pulse width less than a maximum pulse width.
14. The method of claim 13 wherein the combined pulse width and position information is encoded in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels; and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

15. A method comprising the steps of:

identifying first surrounding pels of a first subject pel of an image;

determining a first pulse width value for said first subject pel based on a pattern of said first surrounding pels;

identifying second surrounding pels of a second subject pel of the image which is adjacent to said first subject pel;

determining a second pulse width value for said second subject pel based on a pattern of said second surrounding pels; and

using said first and second pulse width values to;

calculate a combined pulse width to charge a sub-region of a combined region of said first and second subject pels; and

determine position information indicating an alignment of said sub-region within the combined region of said first and second subject pels.

16. The method of claim 15 wherein toner is attracted to the charged sub-region causing a portion of the image represented by said first and second subject pels to be printed as determined by the combined pulse width and the position information.
17. The method of claim 15 wherein the surrounding pels of a subject pel form a rectangular grid with said subject pel at the center.
18. The method of claim 15 wherein the surrounding pels of a subject pel form a diamond shaped grid with said subject pel at the center.

19. The method of claim 15 wherein all possible patterns of surrounding pels are grouped into a plurality of pre-defined pattern categories.
20. The method of claim 19 wherein the plurality of pre-defined pattern categories consists of 16 pattern categories.
21. The method of claim 19 wherein the determining of a pulse width value for a subject pel comprises assigning a pre-defined pulse width value corresponding to the predefined pattern category into which the pattern of surrounding pels falls.
22. The method of claim 21 wherein the combined pulse width and position information is encoded in at least one look up table that provides one set of combined pulse width and position information for an input of:

said first pulse width value; and

said second pulse width value; and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

23. The method of claim 20 wherein the determining of a pulse width value for a subject pel comprises assigning a pulse width value selected from the group of 0 through 15, inclusive, said group corresponding to the 16 predefined pattern categories and the selected value for a subject pel corresponding to the predefined pattern category into which the pattern of pels surrounding the subject pel falls.
24. The method of claim 23 wherein a pulse width value of 0 indicates a totally

blank (white) pel, a pulse width value of 15 indicates a totally black, or fully charged, pel and the pulse width values of 1 through 14 indicate a pel which is to be quality enhanced between white and black by creating a sub-pulse width less than a maximum pulse width.

25. The method of claim 24 wherein the combined pulse width and position information is encoded in at least one look up table that provides one set of combined pulse width and position information for an input of:

said first pulse width value; and  
said second pulse width value; and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

26. A system comprising:

a raster processor for processing page description or vector graphics information of an image into pel data;

first control logic for processing each pel of the image, the processing comprising;  
identifying a window of pels surrounding a subject pel;  
determining an adjusted pulse width value for the subject pel based on a pattern of said surrounding pels;

second control logic for processing at least two adjacent pels, the processing comprising using the adjusted pulse width value of each of the at least two adjacent pels to;

calculate a combined pulse width to charge a sub-region of a combined region of said at least two adjacent pels; and

determine position information indicating an alignment of said sub-region within the combined region of said at least two adjacent pels;

a pulse width modulator for processing input pulse width and alignment information to create an output electronic pulse to control a laser in charging an area of a rotating drum of a printer, wherein the pulse width modulator produces said output electronic pulses at a rate equal to a video data rate of the printer divided by the number of adjacent pels processed at a time by the second control logic; and

wherein the second control logic delivers the combined pulse width and alignment information to the pulse width modulator.

27. The system of claim 26 wherein said at least two adjacent pels consist of two adjacent pels.
28. The system of claim 26 wherein said at least two adjacent pels consist of three adjacent pels.
29. The system of claim 26 wherein the surrounding pels of a subject pel form a rectangular grid with said subject pel at the center.
30. The system of claim 26 wherein the surrounding pels of a subject pel form a diamond shaped grid with said subject pel at the center.
31. The system of claim 26 wherein all possible patterns of surrounding pels are grouped into

a plurality of pre-defined pattern categories.

32. The system of claim 31 wherein the determining of a pulse width value for a subject pel comprises assigning a pre-defined pulse width value corresponding to the predefined pattern category into which the pattern of surrounding pels falls.
33. The system of claim 32 further comprising a storage medium accessible to said first control logic and said second control logic and having stored therein at least one look up table encoding the combined pulse width and position information to provide one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels; and

wherein said steps of calculating the combined pulse width and determining position information comprise retrieving said combined pulse width and position information from said at least one look up table.

34. A program product comprising:  
a computer readable medium; and  
computer readable instructions carried on said medium and effective, when executing in a computer system, to

identify surrounding pels of a subject pel of an image;

for each subject pel of the image, determine a pulse width value based on a pattern of said surrounding pels;

use said pulse width values from at least two adjacent subject pels to;



calculate a combined pulse width to charge a sub-region of a combined region of said at least two adjacent subject pels; and

determine position information indicating an alignment of said sub-region within the combined region of said at least two adjacent subject pels.

35. The program product of claim 34 wherein said at least two adjacent subject pels consist of two adjacent subject pels.
36. The program product of claim 34 wherein said at least two adjacent subject pels consist of three adjacent subject pels.
37. The program product of claim 34 wherein the surrounding pels of a subject pel form a rectangular grid with said subject pel at the center.
38. The program product of claim 34 wherein the surrounding pels of a subject pel form a diamond shaped grid with said subject pel at the center.
39. The program product of claim 34 wherein the instructions are effective when executing to group all possible patterns of surrounding pels into a plurality of pre-defined pattern categories.
40. The program product of claim 39 wherein the plurality of pre-defined pattern categories consists of 16 pattern categories.
41. The program product of claim 39 wherein the instructions are effective when executing to determine the pulse width value for a subject pel by assigning a pre-defined pulse width value corresponding to the predefined pattern category into which the pattern of surrounding pels falls.

42. The program product of claim 34 wherein the instructions are effective when executing to encode the combined pulse width and position information in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels;  
said pattern of said surrounding pels for each of said at least two adjacent pels;  
and

wherein the instructions are effective when executing to calculate the combined pulse width and determine the position information by retrieving said combined pulse width and position information from said at least one look up table.

43. The program product of claim 41 wherein the instructions are effective when executing to encode the combined pulse width and position information in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels; and

wherein the instructions are effective when executing to calculate the combined pulse width and determine the position information by retrieving said combined pulse width and position information from said at least one look up table.

44. The program product of claim 40 wherein the instructions are effective when executing to determine a pulse width value for a subject pel by assigning a pulse width value selected from the group of 0 through 15, inclusive, said group corresponding to the 16 predefined pattern categories and the assigned pulse width value for a subject pel corresponding to the predefined pattern category into which the pattern of surrounding pels falls.

45. The program product of claim 44 wherein a pulse width value of 0 indicates a totally blank (white) pel, a pulse width value of 15 indicates a totally black, or fully charged, pel and the pulse width values of 1 through 14 indicate a pel which is to be quality enhanced between white and black by creating a sub-pulse width less than a maximum pulse width.
46. The program product of claim 45 wherein the instructions are effective when executing to encode the combined pulse width and position information in at least one look up table that provides one set of combined pulse width and position information for an input of:

said pulse width value for each of said at least two adjacent pels; and

wherein the instructions are effective when executing to calculate the combined pulse width and determine the position information by retrieving said combined pulse width and position information from said at least one look up table.